

EFFECT OF PLANTING SEASONS AND GENOTYPES ON GROWTH AND SEED YIELD OF AGGREGATUM ONION (*ALLIUM CEPA* L.VAR. *AGGREGATUM* DON)

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ABSTRACT

A field experiment was conducted to evaluate the effects of planting time and genotypes on morphological and seed yield characteristics of aggregatum onion. Planting time and genotypes had significant influence on almost all parameters studied. Onion planted on September season had better agronomic traits contributing towards yield formation (694.30 kg ha⁻¹). Among the genotypes, growth and seed yield (585 kg ha⁻¹) was highest in the genotype Puttarasal local. Seed yield (807 kg ha⁻¹) was the highest under September season planting in Puttarasal local type.

KEY WORDS: Genotypes, Growth, Planting Season, Seed Yield, Small Onion

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INTRODUCTION

Onion (*Allium cepa* L.) is an important commercial vegetable. Onion is popularly called as “Queen of kitchen” because of its characteristic flavour. The bulb is source of minerals, carbohydrates, protein and vitamin C. Production of quality seeds is an important factor in successful onion cultivation with the growing consciousness about the high yielding varieties among the farmers. The demand for the quality seed is increasing, resulting in more area under seed crops. Date of planting plays an important role in the selection of genotypes for yield improvement and adaptation to particular environmental condition. Therefore, the effect of time of planting is usually more prominent and it is highly sensitive to temperature and photo-period.

Onion crop has a very high yield potential if crop receives judicious management practices during crop growth stages. Though every production factor is a limiting factor, yet one of the factors is the proper season of planting which is desirable for higher seed yield. Hence, a study was undertaken to find out the influence of planting season on growth and seed yield in the aggregatum onion genotypes under existing condition of Coimbatore and also to identify the best genotype for commercial onion seed production.

MATERIALS AND METHODS

An experiment to optimize planting time and evaluate effect of genotype on morphological and seed yield characteristics of aggregatum onion was conducted at the Horticultural College and Research Institute, Coimbatore during 2010-2011. The experiment was laid out in a two factor Factorial Randomized Block Design with three replications in four different planting seasons viz., September, October, November and December were

evaluated as treatments under factor (A) and three genotypes viz., CO (On) 5, Puttarasal type and Santhaipadugai local as treatments under factor (B). The soil was brought to fine tilth by giving four deep ploughings. Weeds, stubbles, roots etc., were removed. Afterwards, the raised beds were formed at a length of 20 m and width of 1 m, and spacing of each bed is 75 cm. The healthy and uniform size bulbs were planted at a spacing of 20 x 15 cm. Dimension of each and every individual plot was 1 x 1 m. The experimental plots were kept free of weeds by regular hand weeding depending upon the weed intensity. The first irrigation was given at the time of planting and followed by life irrigation was given on the third day after transplanting and there after drip irrigations were given daily for 2 hours. Manures, fertilizers and plant protection measures were carried out as per the recommendations given in the Crop Production Techniques of Horticultural Crops (CPG, 2004). Harvesting was made sufficiently early to avoid shattering of seeds. Seeds attained maturity in 40-55 days after flowering. The symptom of harvestable maturity was turning of the skin colour from green to bright yellow. The seed heads were cut with 10-15 cm of stem attached. The cut seed heads were dried in the sun. When the seed heads were completely dry they were threshed and seeds collected after cleaning. Data were recorded on growth and seed yield characteristics such as, plant height (cm), leaves per plant, leaf length, tillers per plant, umbels per plant, flowers per umbel, seeds per umbel and seed yield (kg/ha). The collected data's were analyzed statistically using analysis of variance technique (Steel and Torrie, 1980).

RESULTS AND DISCUSSIONS

Effect of Planting Season on Growth and Seed Yield Characteristics of Aggregatum Onion

Significant different of plant height, leaves per plant, leaf length, tillers per plant, umbels per plant, flowers per umbel, seeds per umbel and seed yield were observed in respect of different planting season (Table 1). The study revealed that the bulbs planted on September produced the tallest plant (61.56 cm), whereas lowest plant height (44.08 cm) was recorded in December season. In early season planting the temperature, day length period prevailed may improved the plant height. These findings of this study are in conformity with the results reported by Joshi *et al.* (1976) and Singh and Singh (1984). The effect of sowing dates on the leaves was significantly maximum (30.93) at September season planting and minimum (21.92) at the December season planting. These results agreed with the results of Singh and Singh (1975) they reported that early sowing favoured leaf, root and bulb growth and gave the highest seed yield. Planting season showed significant variation with respect of leaf length. Leaf length ranged from 40.89 to 57.53 cm and the highest being in September season and lowest in December planting season. Derawadan *et al.* (2002) reported the early dates of sowing gave the maximum leaf length. The number of tillers is a yield component and it is very important in seed yield. Significantly more number of tillers per plant was found at September planting and less number of tillers was found at December planting season. The highest umbels per plant was produced at September season planting (6.76) while the lowest number of umbel per plant (5.39) was noted in December season planting. Boyhan *et al.* (2009) reported that the umbels per plant are usually greater when cool temperature occur in the early season planting. On the other hand September season planting produced that highest flowers per umbel (250.86) whereas the least value for the same parameter (126.26) was recorded from December season. The highest seed number per umbel (251.04) was recorded from the September season while the lowest seeds per umbel were obtained from December season. Finally it was observed that the September planting produced the highest amount of seeds (694.30 kg/ ha) and least amount of seeds (293.50 kg/ ha) was noted from the December season.

Effect of Genotypes on Growth and Seed Yield Characteristics of Aggregatum Onion

Significant difference of plant height leaves per plant, leaf length, tillers per plant, umbels per plant, flowers per umbel, seeds per umbel and seed yield were observed in respect of different genotypes (Table 2). Comparing the means of genotypes (Table 2) it was evident that Puttarasal (G2) gave the greatest (53.69) plant height while CO (On) 5 gave the lowest (49.45) plant height. This difference may be due to the difference in genetic makeup of the cultivars. Significantly greater number leaves per plant was found in Puttarasal type (30.00) and minimum number of leaves per plant was recorded in Santhaipadugai local (23.34). The difference may be due to the genes population in specific variety. The leaf length varied from 46.48 to 50.93 cm. The largest leaves 50.93 cm were measured in Puttarasal type and shortest leaves (46.48 cm) were observed CO (On) 5. The onion variety Puttarasal type produced the highest number of tillers per plant (8.50) and CO (On) 5 recorded the lowest number of tillers per plant (7.12). The significant variation in umbels per plant was observed from Puttarasal type (6.69) and the lowest umbels per plant (5.47) were observed from CO (On) 5. Gill and Harisingh (1989) reported variability in umbels per plant. The genotype Puttarasal produced the highest number of flowers per umbel (209.30) and CO (On) 5 produced the lowest number of flowers per umbel (167.93). The onion variety Puttarasal (219.09) produced the significantly greater number of seeds per umbel and minimum number of seeds per umbel was collected in CO (On) 5 (181.78). The highest seed yield of 585.00 kg / ha was harvested in the onion variety Puttarasal and the genotype CO (On) 5 produced the lowest (397.41 kg/ ha) seed yield. The difference between studied genotypes might be related to genetic makeup by the used cultivars Kandil *et al.* (2013). Similar results were obtained by Kandil *et al.* (2010), Gemma *et al.* (2007) and Soleymani and Shahrajabian (2012).

Interaction Effect of Planting Season and Genotypes on Growth and Seed Yield of Aggregatum Onion

Significant variation on the interaction effect of Planting season and genotypes was observed on the plant height, leaves per plant, leaf length, tillers per plant, umbels per plant, flowers per umbel, seeds per umbel and seed yield is presented in table 3. Highest plant height was obtained in Puttarasal type at September planting (65.61 cm) and minimum was noted in CO (On) 5 at December planting. This may be due to the response of different genotypes to different temperature level. Maximum leaves were found in Puttarasal type at September planting and minimum in Santhaipadugai Local at December planting. It may be due to the reason that different cultivar had different response to temperature during vegetative stage. Highest leaf length was (63.13 cm) found in Puttarasal type, planting at September season and lowest leaf length was 40.40 cm of CO (On) 5 sowing at December planting. In the interaction between planting season and genotypes, more number of tillers per plant (9.47) was noted in Puttarasal type at September planting season and less number of tillers per plant (6.55) was recorded in CO (On) 5 at December season planting. The highest number of umbels per plant was found in Puttarasal type (7.50) planted at September season and the lowest umbels per plant (4.81) in CO (On) 5 at December season. Anisuzzaman *et al.* (2009) reported that maximum umbels were observed in the early planted crop in common onion which lends support to the present findings. Besides this Puttarasal type (G2) produced the maximum number of flowers per umbel (282.40) when planted at September season but the lowest number of flowers per umbel was noted from the CO (On) 5 planted at December season. Significantly the greatest seeds (260.03) was recorded in Puttarasal type (G2) planted at September season and lowest number of seed was in (14.03) CO (On) 5 planted on December season.

The results may be due to availability of more time for maturity in early September season crop, while as planting was delayed seeds was decreased due to shorter time for maturity of crop. Finally, the seed yield was

more (807.00 kg/ha) in Puttarasal type (G2) at September planting and less (233.66 kg/ha) in CO (On) 5 at December planting. These results were in conformity with the findings of Derawadan *et al.* (2002) and Khadil *et al.* (2103)

CONCLUSIONS

The overall results obtained from this study revealed that early planting was always essential to get higher seed yield because yield was significantly reduced with delay in planting. The treatment combination of Puttarasal type with September planting time was more suitable than rest of the treatment combinations under the soil and climatic condition of Coimbatore for seed production of onion.

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APPENDIXES

Table 1: Influence of Planting Season on Growth and Seed Yield Characteristics of Aggregatum Onion

Planting Season (S)	Growth Characteristics				Seed Characteristics			
	Plant Height (cm)	Leaves /plant	Leaf Length (cm)	Tillers / plant	Umbels / plant	Flowers / umbel	Seeds / umbel	Seed yield (kg/ha)
September (S ₁)	61.56	30.93	57.53	9.05	6.76	250.86	251.04	694.30
October (S ₂)	52.44	27.53	49.46	7.57	6.32	215.26	231.03	599.66
November (S ₃)	47.15	24.94	43.83	7.53	5.68	146.77	166.70	342.33
December (S ₄)	44.08	21.92	40.89	6.93	5.39	126.26	154.36	293.50
SEd	0.167	0.235	0.045	0.022	0.022	2.625	0.011	2.350
C.D (0.05)	0.346	0.487	0.094	0.045	0.046	5.444	0.023	4.890

Table 2: Influence of Genotypes on Growth and Seed Yield Characteristics of Aggregatum Onion

Genotypes (G)	Growth Characteristics				Seed Characteristics			
	Plant Height (cm)	Leaves /Plant	Leaf Length (cm)	Tillers/ Plant	Umbels / Plant	Flowers / Umbel	Seeds / Umbel	Seed Yield (kg/ha)
CO (On) 5 (G ₁)	49.45	25.46	46.48	7.12	5.47	167.93	181.78	397.41
Puttarasal type (G ₂)	53.69	30.00	50.93	8.50	6.69	209.30	219.03	585.00
Santhaipadugai Local(G ₃)	50.79	23.34	47.93	7.69	5.95	177.15	201.54	464.25
SEd	0.144	0.203	0.039	0.019	0.019	2.273	0.009	2.040
C.D (0.05)	0.300	0.422	0.081	0.039	0.040	4.714	0.020	4.230

Table 3: Interaction Effect of Planting Season and Genotypes on Growth and Seed Yield of Aggregatum Onion

Planting Season x Genotypes	Growth Characteristics				Seed Characteristics			
	Plant Height (cm)	Leaves /Plant	Plant Height (cm)	Leaves /Plant	Umbels / Plant	Flowers / Umbel	Seeds / Umbel	Seed Yield (kg/Ha)
S ₁ G ₁	58.61	30.00	56.43	8.42	6.21	226.40	245.05	603.00
S ₁ G ₂	65.61	35.00	63.13	9.47	7.50	282.40	260.03	807.00
S ₁ G ₃	60.48	27.80	57.53	9.26	6.59	243.80	248.04	673.00
S ₂ G ₁	50.41	26.40	47.03	6.48	5.70	191.00	190.03	483.00
S ₂ G ₂	55.53	33.00	52.05	8.97	7.03	242.00	258.02	726.00
S ₂ G ₃	51.38	24.40	49.23	7.27	6.22	212.80	245.05	587.00
S ₃ G ₁	45.73	23.36	42.06	7.03	5.15	139.93	150.02	270.00
S ₃ G ₂	48.33	27.83	44.50	8.34	6.33	164.60	185.04	467.00
S ₃ G ₃	47.40	21.68	43.83	7.24	5.56	135.80	165.04	320.00
S ₄ G ₁	43.06	22.10	40.40	6.55	4.81	114.40	142.03	233.66
S ₄ G ₂	45.30	24.16	43.23	7.24	5.92	148.20	173.03	370.00
S ₄ G ₃	43.90	19.50	40.89	7.00	5.45	116.20	148.03	277.00
SEd	0.289	0.407	0.078	0.038	0.039	4.546	0.019	4.080
C.D (0.05)	0.600	0.844	0.162	0.079	0.081	9.429	0.040	8.470

